

WHAT IS CLAIMED IS:

1. An apparatus for manufacturing an array of biopolymers on a support, said apparatus comprising:

5 (a) a manifold comprising at least two compartments, each of said compartments being in fluid communication with a respective gas inlet,

(c) a perforated element in fluid communication with said manifold,

(d) a chamber in fluid communication with said perforated element, said chamber comprising an opening in a wall thereof,

10 (e) a device for dispensing reagents for synthesizing an array of biopolymer features on a support, at least a portion of said device being within said chamber, and

(f) a mechanism for moving said support into and out of said chamber through said opening and for positioning said support relative to said device for dispensing reagents.

15 2. An apparatus according to Claim 1 wherein said perforated element comprises about 5 to about 200 perforations per square inch.

3. An apparatus according to Claim 1 wherein said perforated element is  
20 about 0.2 to about 2 inches thick and the diameter of each of said perforations is about 0.03 to about 0.25 inches.

4. An apparatus according to Claim 1 wherein said perforated element is  
25 0.02 to about 0.2 inches thick and said apparatus comprises a honeycomb element in fluid communication with said perforated element wherein the thickness of said honeycomb element is about 1 to about 1.5 inches and wherein the ratio of length of said honeycomb element to honeycomb features is at least about 7 to 1.

5. An apparatus according to Claim 1 wherein said opening is in a wall of  
30 said chamber opposite to said perforated element.

6. An apparatus according to Claim 5 wherein the walls of said chamber leading to said wall comprising said opening are tapered.

7. An apparatus according to Claim 1 wherein said reagents are reagents for synthesizing an array of oligonucleotides on said support.

5 8. An apparatus according to Claim 1 wherein said gas inlets are oriented with respect to said respective compartments of said manifold such that gas enters said respective compartments in a direction that is substantially normal to the direction in which gas exits said manifold.

10 9. An apparatus according to Claim 1 wherein said manifold comprises at least four compartments.

10 10. An apparatus according to Claim 1 wherein said chamber has vertical symmetry.

15 11. An apparatus according to Claim 1 wherein the angles in the interior of said chamber are beveled.

20 12. An apparatus according to Claim 1 further comprising a controller for controlling the movement of said mechanism for moving said support.

13. An apparatus according to Claim 12 wherein said mechanism is a robotic arm.

25 14. An apparatus according to Claim 1 wherein said opening comprises a door in a wall of said chamber for ingress and egress of said support.

30 15. An apparatus according to Claim 14 wherein the dimensions of said door are sufficient to permit ingress and egress of a mechanism for holding a support on which an array of biopolymer features is synthesized.

16. An apparatus according to Claim 14 wherein the dimensions of said door are sufficient to permit ingress and egress of a device for dispensing reagents for synthesizing an array of biopolymer features on a support.

17. An apparatus according to Claim 14 wherein said door is in a wall of said chamber opposite to said outlet element.

18. An apparatus according to Claim 1 comprising at least four gas inlets.

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19. An apparatus according to Claim 18 wherein each of said gas inlets comprises a valve.

20. An apparatus according to Claim 18 wherein said gas is introduced into said manifold at a pressure of about 60 to about 80 psi.

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21. An apparatus according to Claim 1 wherein each compartment comprises one or more elements for diffusing said gas within said compartment.

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22. A method for synthesizing an array of biopolymers on a support, said method comprising:

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(a) introducing a support into a reaction chamber wherein said reaction chamber has a positive and substantially uniform flow of gas therethrough wherein said gas exits said reaction chamber through a gas outlet in a direction that is the same as said substantially uniform flow and wherein said surface of said support is activated,

(b) bringing said support and a dispensing system for dispensing reagents for the synthesis of said biopolymers into a dispensing position relative to said activated surface,

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(c) dispensing said reagents to said surface at discrete feature locations,

(d) removing said support and/or said dispensing system from said relative dispensing position, and

(e) optionally repeating steps (a) through (d) until said biopolymer is formed.

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23. A method according to Claim 22 wherein said gas is introduced into said reaction chamber through a mechanism that forms a spatially uniform pressure field of said gas.

24. A method according to Claim 22 wherein said gas is introduced into one or more compartments of a manifold wherein each of said compartments is in fluid communication with a valve through which pressurized gas is introduced.

5           25. A method according to Claim 24 wherein said manifold is in fluid communication with an outlet element having a plurality of openings through which said gas passes into said chamber, said outlet element comprising about 5 to about 200 openings per square inch.

10           26. A method according to Claim 24 wherein said manifold is in fluid communication with an outlet element having a plurality of openings through which said gas passes, said outlet element comprising about 5 to about 200 openings per square inch, said element being in fluid communication with a honeycomb element through which said gas passes into said chamber wherein the thickness of said honeycomb  
15           element is about 1 to about 1.5 inches and wherein the ratio of length of said honeycomb element to honeycomb features is at least about 7 to 1.

27. A method according to Claim 22 wherein said gas outlet comprises a door in a wall of said chamber.

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28. A method according to Claim 22 wherein the water content of said gas is less than about 1 % by volume.

29. A method according to Claim 22 wherein said gas is selected from the  
25           group consisting of nitrogen, argon, neon and helium.

30. A method according to Claim 22 wherein said reagents are monomer addition reagents.

30           31. A method according to Claim 22 wherein an array of said biopolymers is synthesized on said support.

32. A method according to Claim 22 wherein said biopolymers are polynucleotides or polypeptides.

33. A method according to Claim 22 wherein said biopolymers are synthesized on said surface in multiple arrays and said support is subsequently diced into individual arrays of biopolymers on a support.

5 34. A method according to Claim 22 for synthesizing an array of biopolymers on a surface of a support, said method comprising adding one or more polymer subunits at each of multiple feature locations on said support during each of multiple rounds of subunit additions wherein each round of subunit additions comprises:

- (a) introducing said support into said reaction chamber,
- 10 (b) bringing said support and a dispensing system for dispensing said polymer subunits for the synthesis of said biopolymers into a dispensing position relative to said activated discrete sites on said surface,
- (c) dispensing said polymer subunits to said discrete sites, and
- (d) removing said support and/or said dispensing system from said relative
- 15 dispensing position.

35. A method according to Claim 22 wherein said biopolymers are synthesized on said surface in multiple arrays and said support is subsequently diced into individual arrays of biopolymers on a support.

20 36. A method according to claim 22 further comprising exposing the array to a sample and reading the array.

37. A method according to claim 36 comprising forwarding data representing  
25 a result obtained from a reading of the array.

38. A method according to claim 37 wherein the data is transmitted to a remote location.

30 39. A method according to claim 36 comprising receiving data representing a result of an interrogation obtained by the reading of the array.

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